PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO 43352	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/IB2005/000599	International filing date *(day/month/year)* 10.03.2005	Priority date *(day/month/year)* 15.03.2004
International Patent Classification (IPC) or national classification and IPC INV. F02M61/14 F02M69/04 F02D41/30 F02D41/40		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 4 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
03.01.2006	25.04.2006
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Jackson, S Telephone No. +49 89 2399-7081

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2005/000599

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-13	as originally filed
Claims, Numbers	
1-10	received on 03.01.2006 with letter of 02.01.2006
Drawings, Sheets	
1/7-7/7	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2005/000599

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-10
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-10
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 2002/007816 A1 (ZUR LOYE AXEL O ET AL) 24 January 2002 (2002-01-24)
D2: US 2002/020388 A1 (WRIGHT JOHN F ET AL) 21 February 2002 (2002-02-21)
D3: US 2002/017269 A1 (ZUR LOYE AXEL O ET AL) 14 February 2002 (2002-02-14)
D4: US 2003/168037 A1 (ZUR LOYE AXEL O ET AL) 11 September 2003 (2003-09-11)

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 6 is not new in the sense of Article 33(2) PCT.

The document D1 discloses all the features of claim 1, including a fuel injection mode which is changed from a cylinder injection mode to a port injection mode at a point of time when so requested (see abstract).

It should be noted that the subject matter of claim 1, although not of a broad nature, merely describes a change of injection mode. the feature of this occurring at a point of time when so requested is normal practice, as changing the injection mode when not requested would be ridiculous.

Documents 2-4 also disclose the subject matter of claim 1, as can be seen in the relevant passages cited in the search report.

Dependent claims 2-10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty, see documents D1-D4 and the corresponding passages cited in the search report.

Re Item VII

Claim 6 contains all the features of claim 1. Indeed, claim 6 appears not to contain any additional features, and appears to be identical to claim 1. This could cause problems if clarity, as it is not obvious what the applicant wishes to achieve by this. The applicant should be aware that Rule 6.4a PCT requires any claim which includes all the features of one or more other claims shall do so by reference to the other claim, and should then state the additional features defining the claim itself.

Enclosure of January 02, 2006

WO Patent Application No.: PCT/IB2005/000599
Applicant: TOYOTA JIDOSHA KABUSHIKI KAISHA
Our ref.: WO 43352

New set of claims

1. A fuel injection apparatus for an internal combustion engine (10) which performs a direct injection operation for injecting fuel from an injector for cylinder injection (33) into a cylinder and a port injection operation for injecting fuel from an injector for intake port injection (31) into an intake port (13), characterized in that

when a request to change a fuel injection mode from a mode of fuel injection from the injector for cylinder injection (33) to a mode of fuel injection from the injector for intake port injection (31) is made, the fuel injection mode of a particular cylinder is changed at a point of time according to the request to change the fuel injection mode for the particular cylinder.

2. The fuel injection apparatus for an internal combustion engine (10) according to claim 1, characterized in that

in the case where the request to change the fuel injection mode is made before the fuel injection mode is set to a port injection mode, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) simultaneously with the request to change the fuel injection mode.

3. The fuel injection apparatus for an internal combustion engine (10) according to claim 1, characterized in that

in the case where the request to change the fuel injection mode is made during a period after the port injection mode is set and before a direct injection mode is

set, when a requested port injection mode is an intake synchronous injection mode, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) simultaneously with the request to change the fuel injection mode, and when a requested port injection mode is an intake non-synchronous injection mode, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) after one cycle has elapsed since the request to change the fuel injection mode is made.

4. The fuel injection apparatus for an internal combustion engine (10) according to claim 1, characterized in that

in the case where the request to change the fuel injection modes is made after the port injection mode and the direct injection mode are set, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) after one cycle has elapsed since the request to change the fuel injection mode is made.

5. A fuel injection apparatus for an internal combustion engine (10) according to claim 1, wherein

when a fuel injection mode is changed from a mode of fuel injection from the injector for cylinder injection (33) to a mode of fuel injection from the injector for intake port injection (31), the fuel injection mode is set to an intake synchronous injection mode until an amount of fuel adhering to a wall surface of the intake port (13) due to port injection becomes stable.

6. A fuel injection control method for an internal combustion engine (10) which performs a direct injection operation for injecting fuel from an injector for cylinder injection (33) into a cylinder and a port injection

operation for injecting fuel from an injector for intake port injection (31) into an intake port (13), characterized in that

when a request to change a fuel injection mode from a mode of fuel injection from the injector for cylinder injection (33) to a mode of fuel injection from the injector for intake port injection (31) is made, the fuel injection mode of a particular cylinder is changed at a point of time according to the request to change the fuel injection mode for the particular cylinder.

7. The fuel injection control method for an internal combustion engine (10) according to claim 6, characterized in that

in the case where the request to change the fuel injection mode is made before the fuel injection mode is set to a port injection mode, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) simultaneously with the request to change the fuel injection mode.

8. The fuel injection control method for an internal combustion engine (10) according to claim 6, characterized in that

in the case where the request to change the fuel injection mode is made during a period after the port injection mode is set and before a direct injection mode is set, when a requested port injection mode is an intake synchronous injection mode, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) simultaneously with the request to change the fuel injection mode, and when a requested port injection mode is an intake non-synchronous injection mode, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection

(31) after one cycle has elapsed since the request to change the fuel injection mode is made.

9. The fuel injection control method for an internal combustion engine (10) according to claim 6, characterized in that

in the case where the request to change the fuel injection modes is made after the port injection mode and the direct injection mode are set, the fuel injection mode is changed to the mode of fuel injection from the injector for intake port injection (31) after one cycle has elapsed since the request to change the fuel injection mode is made.

10. A fuel injection control method for an internal combustion engine (10) according to claim 6, wherein

when a fuel injection mode is changed from a mode of fuel injection from the injector for cylinder injection (33) to a mode of fuel injection from the injector for intake port injection (31), the fuel injection mode is set to an intake synchronous injection mode until an amount of fuel adhering to a wall surface of the intake port (13) due to port injection becomes stable.